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Acculturation Coping Leads to Heightened Sensitivity to Socially Hurtful Events

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Abstract

This research examined the hypothesis that challenging experiences in acculturation may lead to heightened reactivity to socially hurtful events. Study 1 found that compared to a prime of acculturating to a similar foreign culture, priming acculturation to a distant culture (indicating more challenges) led to greater reported pain towards hurtful interpersonal events. Study 2 examined whether foreign students in the U.K. and immigrants in the U.S. exhibited a heightened reaction to social exclusion. Results showed that among participants with weaker host culture identification, social exclusion had a greater disruptive effect on cognitive performance, as indicated by longer reaction time on the Stroop task. These findings suggested that individuals who face greater obstacles during acculturation are more sensitive to social exclusion.

Acculturation Coping Leads to Heightened Sensitivity to Socially Hurtful Events

Moving generally can induce anxiety, stress, and loneliness (Oishi, 2010). Moving across borders, an experience that is increasingly common in globalized societies, adds an additional layer of challenge in navigating through an unfamiliar culture. Changes that result from people's contact with another culture is called "acculturation" (Schwartz, Unger, Zamboanga, & Szapocznik, 2010). Prior research has examined acculturation from multiple perspectives. For example, acculturation was studied as a process to better understand how culture is acquired, maintained, and modified by people (Mesoudi, 2009). In another context, acculturation was examined in terms of how people's experiences in a new culture (e.g., new identity) are negotiated psychologically (Nguyen & Benet-Martínez, 2013). Acculturation has also been studied as a factor for physical and psychological health among immigrant populations (McDonald & Kennedy, 2004).

One predominant approach in acculturation research has been to examine different types of adaptation as acculturation outcomes. For example, many studies have examined how acculturation influences maintenance of psychological and emotional well-being (psychological adaptation), development of behavioral and social competence (sociocultural adaptation), and gaining of socio-economic status and resources (socio-economic adaptation) (for a review, see Nguyen & Benet-Martínez, 2013; Schwartz et al., 2010). Complementing this approach, an increasingly influential approach is to examine ways in which individuals cope with the stress and difficulties experienced in acculturation (Berry, 2006; Demes & Geeraert, 2015; Ward & Kennedy, 2001). Lu et al. (2017) took this approach with the specific focus on the interpersonal relationship domain. Lu and colleagues hypothesized and found that to cope with interpersonal difficulties experienced during acculturation, individuals experience a heightened response to

socially hurtful events. In the present article, we present three studies that further examined this hypothesis. Before describing these studies, we elaborate on the theoretical framework for this set of studies.

Coping during acculturation

As the definition indicates earlier, acculturation implicates changes in languages, cultural norms, and values, etc. These changes can create challenges and are stressful, and the ways in which people cope with them have long-term effects on the outcomes of acculturation (Schwartz et al., 2010). Research suggests that poor adaptations are associated with greater challenges and obstacles experienced during acculturation, for example, due to a large cultural distance, or large discrepancies between social and physical environments of heritage and host cultures (Suanet & van de Vijver, 2009). Successful coping in the interpersonal domain is critical in acculturation. Research on social support shows that supportive interpersonal relationship during acculturation aids psychological adjustments, for example by reducing stress, anxiety, and by increasing well-being and sense of belongingness (for a review, see Berry, 2006). Prior research also indicates that positive interpersonal contacts and communications facilitate social competence and fitness (for a review, see Kim & McKay-Semmler, 2013).

Despite its importance, interpersonal relationships pose substantial challenges during acculturation (Zimmermann & Neyer, 2013). In a foreign country, individuals are faced with geographical barriers in maintaining close ties with family and friends left behind while facing the challenge of developing new interpersonal ties in a new culture. In addition, interpersonal experiences of segregation, prejudice, and discrimination in a new culture are widely reported and these experiences are known to hinder interpersonal adaptation (e.g., development of a

strong social network) (Clark, Anderson, Clark, & Williams, 1999). Nevertheless, relative to the outcomes of these challenges, little is currently understood how acculturating individuals cope with interpersonal difficulties. We hypothesize that in response to these interpersonal challenges, acculturating individuals may experience heightened social pain sensitivity, which may help defend individuals from (further) threats to social connections. This process is akin to the ways that physical pain triggers responses to protect the body from further damage.

Reactivity to socially hurtful events during acculturation

It has been argued that heightened pain sensitivity may be an adaptive response, alerting individuals to anticipate potential threats and proactively cope with them (Rhudy & Meagher, 2000). Prior research found that acculturation implicates people's experience with physical pain. In one study, Chinese-American cancer patients less adapted to American culture (facing greater obstacles) reported greater severity of chronic physical pain and pain interference with daily life activities (Edrington et al., 2010; Palmer et al., 2007). In another study, among Asian-American university students, compared to those born in the United States, those born in Asia exhibited a lower pain threshold and tolerance in a cold pressor task (Chan, Hamamura, & Janschewitz, 2013). Chan and colleagues argued that the observed heightened pain sensitivity may be an adaptive response to the threats experienced in the acculturation process, facilitating acculturating individuals to vigilantly navigate a new culture.

In a similar way, to help individuals defend from (further) interpersonal damage and develop new social connections in a new culture, we postulate that individuals' social pain sensitivity may also be heightened. There is a parallel between physical and social pain grounded in the research evidence that threats to social connections are modulated through the (physical)

pain system (DeWall et al., 2010). Research has suggested that socially hurtful events, such as break up, rejection, and exclusion, are felt as pain and share many common psychological and biological attributes with physical pain (Eisenberger, 2012; MacDonald & Leary, 2005; Woo et al., 2014). One theory of these commonalities is that because social connections are essential for psychological functioning, and thus survival, the system that signals threats to social connection has evolved by building upon more primitive structures for representing physical pain (Eisenberger, 2012; but see Woo et al., 2014). To the extent that acculturation heightens the physical pain defense system, it may also influence the social pain sensitivity.

Importantly, recent research identified social interdependence as a contextual factor that shapes people's responses to socially hurtful events (Over & Uskul, 2016; Pfundmair, Aydin, Du, Yeung, Frey, & Graupmann, 2015; Pfundmair, Graupmann, Frey, & Aydin, 2015; Ren, Wesselmann, & Williams, 2013; Uskul & Over, 2014). Uskul and Over (2014) found that herders in Turkey, with an economic livelihood that depends more on interactions with strangers, estimated social ostracism to be more painful than farmers who are living in socially interdependent relationships. This finding suggests that individuals with tight-knit interpersonal networks may be less affected by the cues of social exclusion and are more tolerant of social pain. Our hypothesis is consistent with this body of research in that interpersonal difficulties that many people experience in acculturation pose serious threats to their social interdependence and may result in stronger reactions to social exclusion.

The hypothesized association between acculturation and heightened sensitivity to socially hurtful events was previously confirmed in Lu et al. (2017). In that study, a heightened social pain sensitivity was only found among people weakly identifying with the new culture (e.g., weak identification with its values, customs, and people). Lu et al. argued that this relationship

reflects the greater interpersonal challenges that these people were experiencing in the new culture. These findings were, however, based on correlational and self-report data, leaving the causal direction of the associations ambiguous.

The Current Research

To address these limitations of previous work, we examined the hypothesized relationship in three experimental studies. In Study 1, acculturation was operationalized by manipulating perceived cultural distance. This approach is informed by prior research that manipulated different features of living abroad experience to alter the novelty of acculturation experience (Maddux & Galinsky, 2009. See also Cheng, & Leung, 2013; Leung & Chiu, 2008). Study 1 examined whether imagining acculturation experience in a more distant culture, hence greater challenges, would lead to greater perceived severity of pain in social hurtful events.

In Study 2, acculturation was operationalized by individual differences in levels of acculturation with host and heritage cultures. Past work in this area (Berry, 1997; see Nguyen & Benet-Martínez, 2013 for a review) suggests that acculturation is a bi-dimensional construct comprising individuals' adjustment to a new culture (assessed by host culture acculturation) and maintenance of their heritage culture (assessed by the heritage culture acculturation). Study 2 manipulated the social exclusion experience among individuals who are undergoing acculturation process, and examined their psychological reaction to social exclusion. Study 2a was conducted with international students in the United Kingdom. Study 2b was conducting with immigrants in the United States. We anticipate that a salient social exclusion experience would lead to a stronger reaction, especially among participants with weak host culture acculturation,

who may face greater challenges in the new culture including interpersonal challenges and difficulties (Lu et al., 2017).

Study 1

Method

Participants

We recruited 116 university students in Hong Kong (72% females, mean age = 21.20, *SD* = 3.02) who had a prior experience studying abroad (mean duration = 5.69 months, *SD* = 7.97). Most participants (71.8%) had their studying abroad experience in Western countries, e.g. United States, Australia, Unaided Kingdom, etc. 14.8% participants had the experience of studying in Chinese speaking countries and areas, e.g. Singapore, Taiwan; and 13. 6% participants have studied in other countries in Asia, e.g. Japan, Korean, Thailand, etc. There were six participants who did not have a prior experience studying abroad—these were students from various countries (e.g., Canada, Germany, India, the United States) currently studying in Hong Kong as international students. Because these students were currently undergoing acculturation, their acculturation experience is qualitatively different from local students to whom acculturation was experienced in the past. Moreover, the priming materials below were designed based on the acculturation experience of the former group. For these reasons, international student participants were excluded during the data analysis.

Procedure

Participants completed the study on-line. After signing the informed consent electronically, participants were randomly assigned to two experimental conditions, reading one of two passages (Appendix). The *small cultural distance* passage described a person adjusting to an unspecified foreign country that shares many cultural similarities with the home culture in

terms of beliefs, norms, languages, and customs. The *large cultural distance* passage described an adjustment to a culture that differs greatly from home culture in these aspects. In both passages, the person was described as generally enjoying the experience in order to reduce the role of negative affect, which may confound with emotional pain. The large cultural distance passage should be seen as more challenging and thus requiring a greater amount of efforts in adjusting. As a manipulation check, after reading the passage, participants rated the perceived amount of efforts needed in the cultural adjustment, on a 100-point scale (0= no effort, 100 = lots of effort).

To assess perceived severity of hurtful interpersonal events, following the manipulation, participants were asked to rate how painful four events felt to them on a 100-point scale (0 = not painful at all, 100 = extremely painful). The four events were "breaking up/getting a divorce," "losing contact with close friends," "betrayed by a romantic partner," and "ignored by friends." Past research indicates that these are some of the most common types of socially hurtful events (Leary, Springer, Negel, Ansell, & Evans, 1998). The four items were internally consistent (alpha =.79).

Finally, participants reported their demographic information and the duration of their studying abroad experience.

Results

The perceived amount of efforts needed was greater in the large cultural distance condition (M = 60.72, SD = 18.15) than in the small cultural distance condition (M = 28.84, SD = 19.38), d = 1.70. This validates the manipulation of acculturation experience.

In addition, the two conditions differed on the perceived pain ratings with a small effect size, d = .40, such that the hurtful interpersonal events were perceived as more painful in the

large (M = 73.16, SD = 16.09) than the small cultural distance condition (M = 66.00, SD = 19.95). Controlling the duration and the host countries of studying abroad did not affect this finding. This finding suggests that socially hurtful events are perceived as more painful in acculturating to a more dissimilar culture, which would entail greater challenges.

Study 2

This study aimed to examine the effects of social exclusion in two populations of acculturating individuals: international students in the United Kingdom (Study 2a) and immigrants in the United States (Study 2b). Complementing a subjective measure of social pain sensitivity used in Study 1, Study 2 assessed acculturating individuals' reaction to social pain event through their cognitive performance on a version of the Stroop task.

The Stroop task is a reliable and valid measure of cognitive processing because accurate performance requires attention maintenance, cognitive flexibility, and rapid and accurate inhibition of prepotent responses (Engle, 2002). Prior research suggests that because pain, both physical and emotional, involves a greater commitment of cognitive resources, it has the effect of distracting people's attention and disrupting cognitive process (Chen, Williams, Fitness, & Newton, 2008; Eccleston & Crombez, 1999). In fact, Chen and colleagues (2008) found a deteriorated performance on the Stroop task among the participants who recalled a social rejection event, suggesting that a social exclusion manipulation can impair individuals' cognitive performance.

We anticipate that recalling social exclusion experience leads to a lowered performance on the Stroop task (relative to those recalling social inclusion). Furthermore, based on prior

findings (Lu et al., 2017), we anticipate this effect to be more pronounced among acculturating individuals with weaker host culture acculturation.

Study 2a

Method

Participants

Fifty-two Chinese students at a university of the United Kingdom who identified themselves as having Chinese heritage culture participated in the study (54% female, mean age = 23.10, *SD* = 1.76). The number of years spent in the United Kingdom ranged from 0.5 to 11 (*M* = 2.90, *SD* = 2.71). Participants were recruited from a variety of sources and via word of mouth. They each received £4 in exchange for participation.

Procedure

The study was administrated in Chinese. Participants were first asked to answer a series of demographic questions and about their acculturation. Participants were then randomly assigned to one of two experimental conditions: *social exclusion* (*n* = 25) and *social inclusion* (*n* = 27). In both conditions, participants were asked to recall and write about a prior experience involving "being rejected in some way" or "very accepted". This task was designed to induce participants to relive the original exclusion/inclusion experience. Similar reliving tasks have proven to be effective at producing feelings of interpersonal rejection (Maner, DeWall, Baumeister, & Schaller, 2007; Pickett, Gardner, & Knowles, 2004). To facilitate participants relive their previous experience, they were allowed unlimited time to recall and write about the events, describing what had happened to them and how they had felt. Immediately afterward, all participants completed the IQ test[1] and the Stroop task (order was counterbalanced).

Measures

Acculturation. Participant completed Vancouver Index of Acculturation (VIA: Ryder, Alden, & Paulhus, 2000). Responses were indicated on a 9-point scale (1=strongly disagree, 9=strongly agree). The measure is designed to separately assess identification with host and heritage cultures (10 items for each culture). For host culture identification, sample items are "I enjoy social activities with typical British people," "I am comfortable working with typical British people," and "I am interested in having British friends." Participants also completed the same set of items with respect to their heritage culture (e.g., "I enjoy social activities with people from the same heritage culture as myself"). Both subscales were internally consistent (alphas ≥ .79).

Stroop task. The Stroop task used was an 84-item word–color matching task. The task was in Chinese and consisted of simplified Chinese characters. For each item, participants were asked to quickly indicate the color of the ink in which a stimulus is printed (by pressing one of four keys) while attempting to ignore the stimulus itself. The present task made use of four ink colors: red, green, blue, and black. Three trial types were included: (1) neutral trials, in which a square with printed color was showed; (2) congruent trials, in which the ink color was compatible with the word name (e.g., "红" (red) printed in red ink); and (3) incongruent trials, in which the ink color was incongruent with the word name (e.g., "蓝" (blue) printed in red ink). The types of trials were intermixed, and participants completed a total of 28 incongruent, 28 congruent, and 28 neutral trials. There are different scoring methods for the Stroop task, such as scoring by time, error, both time and error, and the number of items answered within a specified time limit (Golden, 1987). To the extent that the ability to inhibit naming the word name in favor of reading the color of the ink is indicative of performance of Stroop task (MacLeod, 1991),

reaction times (RTs) in the incongruent trials can serve as the key measure of cognitive performance (Chen et al., 2008). This was done in the present study.

Results

To examine if international students' acculturation is associated with their heightened reaction to the social exclusion priming, we regressed Stroop RT on social exclusion condition (0 = inclusion, 1 = exclusion), centered host culture identification score, and their interaction. As expected, we observed an interaction effect (b = -140.46, SE = 66.90, f^2 = .09, a small effect size). The interaction effect was decomposed via simple slopes analyses (see Figure 1). Under the social exclusion priming condition, host culture identification was negatively associated with reaction time on the Stroop task (b = -113.58, SE = 55.69), suggesting that compared to participants with stronger host cultural identification, those with weak host culture identification performed worse (longer RTs), and thus exhibited a heightened reaction to social hurtful situations. There was no comparable effect of host culture identification in the social inclusion condition (b = 26.88, SE = 38.20).

A similar regression analysis using centered heritage culture identification score was conducted, and it revealed no substantial interaction effect with social exclusion conditions (b = .15, SE = .32, f^2 = .005), suggesting that heritage culture identification did not play a role (see Supplemental Table 1 for correlation coefficients between variables).

In sum, we found that the recalling social exclusion experience interfered with the cognitive processes among acculturating individuals especially those who weakly identified with the host culture. Although this finding supports our hypothesis, the sample size was small. As such, Study 2b was conducted with a larger sample size and a different population of acculturating individuals to examine the robustness of our inference.

Study 2b

Method

Participants

From Amazon.com Mechanical Turk, we recruited individuals who reported that (a) they are currently living in the United States but born elsewhere, (b) have been living in the U.S. no more than 10 years (this was checked by subtracting the age when the participants moved to the U.S. from their current age), and (c) did not report American culture as their heritage culture. One hundred and twenty-eight participants met these criteria (57% female, mean age = 31.64, *SD* = 7.91). The length of their stay in the U.S. ranged from 0.5 to 10 years (*M* = 3.29, *SD* = 2.07). Eight participants who did not have valid responses to the recall tasks (e.g., stating "N/A" and "Nothing particular") were excluded from the analysis. As such, 120 participants were included the data analysis.

Procedure

The procedure was the same as Study 2a, with the exception that the study was administered in English and all online using software Inquisit Web 4.0. After indicating their informed consent, participants provided their demographic information and completed Vancouver Index of Acculturation (alpha =.92 for host culture identification and alpha =.90 for heritage culture identification). One change from Study 2a was an item asking the perceived effort needed for adjusting to the American culture on a 100-point scale (0= no effort, 100 = lots of effort). Participants were then randomly assigned to the social exclusion/inclusion memory recall task and completed the Stroop task. One additional change was the manipulation check—

after the Stroop Task, participants indicated how much pain they experienced during the social exclusion/inclusion task on a 10-point scale (1 = no pain, 10 = intense pain).

Results

The perceived amount of efforts needed for acculturation adjustment was negatively associated with the host culture identification (r = -.28 with a medium effect size) but the association between the perceived effort and the heritage culture identification was much smaller (r = .04) (see Supplemental Table 2 for correlation coefficients between variables). This supports our assumption that weaker host culture acculturation reflects greater efforts perceived to be involved in adjusting to a new culture. With respect to the manipulation check for the social pain recalling task, the participants in the social exclusion condition reported more pain (M = 4.19, SD = 2.95) compared to the inclusion condition (M = 1.38, SD = 1.96), with a large effect size, d = 1.12. This validates the social exclusion manipulation.

Stroop RT in the incongruent trials was regressed on the social exclusion condition (0 = inclusion, 1 = exclusion), centered host culture identification score, and their interaction. In addition, because the participants in Study 2b were more heterogeneous with respects to their demographic characteristics, the measured demographic characteristics (age, education level, and English proficiency) were controlled for in the regression. The results do not differ with or without these covariates, see Supplemental Table 3 for details of the regression coefficients.

Consistent with Study 2a, there was a significant interaction effect between the host culture identification and the social exclusion manipulation (b = -158.03, SE = 69.20, f^2 = .05, a small effect size). The interaction effect was decomposed via simple slopes analyses (see Figure 2). In the social exclusion condition, host culture identification was associated with shorter

reaction time (b = -113.31, SE = 43.43), suggested that participants with weak identification with American culture performed worse (longer RTs) compared to those with a strong identification. However, this association was close to zero in the social inclusion condition (b = 37.20, SE = 56.01). A similar regression analysis using centered heritage culture identification score revealed no substantial interaction effect with the social exclusion manipulation (b = -.110, SE = 73.40, f^2 = .02). Both of these patterns replicated Study 2a.

General Discussion

In three studies, we tested the effect of acculturation on heightened reactivity to socially hurtful events. Study 1 found that priming acculturating to a distant culture led to the greater perceived severity of socially hurtful events. Study 2a and Study 2b found that recalling an episode of social exclusion led to a deteriorated performance in Stroop task among international students and immigrants who weakly identified with the host culture. This finding suggests that those who strongly identified with the host culture were protected from the effect of social exclusion.

Study 2 did not find the substantial effect of heritage culture identification, which is consistent with prior research (Lu et al., 2017; Ryder, Alden, & Paulhus, 2013). This suggests that immigrants' social difficulties are better indicated by their host culture acculturation than heritage culture acculturation. However, it should be noted that Jurcik et al. (2013) found that heritage acculturation was a protective factor for individuals residing in the ethnically concentrated (but not sparse) neighborhood. This suggests that the role of heritage acculturation may be moderated by external contexts, and future studies can examine this possibility. Furthermore, it should be noted that in the literature biculturalism (adopting both host and heritage cultures) is robustly associated with different adaptation outcomes (Berry, 2006;

Nguyen & Benet-Martínez, 2013). In future studies, individuals' acculturation can be examined via a latent profile analysis to further illuminate the effects of interpersonal difficulties on adaptation outcomes across different subgroups of acculturating individuals.

We think these findings and the hypothesis they support are novel to the literature. Previous literature focused on the adaptions as long-term outcomes of acculturation. Complementing the past literature, we focused on the stress and coping process during acculturation. Our research drew a connection to pain research where researchers have argued that heightened pain sensitivity is an adaptive response to signal the potential threats and alert individuals to cope proactively. For example, research has shown that asking participants to anticipate potential threats (e.g. electronic shocks) can heighten their physical pain sensitivity (Rhudy & Meagher, 2000). Similar to this rationale, we postulated that in acculturation, experiencing interpersonal challenges may enact specific psychological responses to defend against (further) interpersonal damages (Eisenberger & Lieberman, 2005), and thus lead to a heightened sensitivity to social exclusions. In the current research, we demonstrated a heightened social pain sensitivity among people who face greater interpersonal challenges (indicated by a prime of acculturating to a new country with a larger cultural difference and a weak identification with the new culture). These support the emerging perspective in the literature that examining the acculturation stress and coping responses is critical because the way people cope with these stress and challenges over time would have impacts on the adaptation outcomes in a long run (Berry, 2006).

The current research also has some practical implications. As discussed above, the enacted pain responses, as a proactive coping response, may motivate subsequent actions to help establish new social ties in a new culture and to preserve old ties from a heritage culture (Lu et

al, 2017). Future research may develop interventions where acculturation individuals are encouraged to approach social inclusion situations (e.g. participating local cultural activities) or seek social support from friends and families, and examine whether these interpersonal experiences alleviate their heightened sensitivity to interpersonal pain and contribute to their long-term psychological and sociocultural adaptations.

Finally, given that the current research underscores the process of stress and coping during acculture, another way to extend the current findings would be to examine the coping responses in other stressing and threatening contexts. For example, there are already evidence suggesting that, compared to natives, immigrants exhibit the pattern of heightened reactivity to physical pain (Chan et al., 2013; Edrington et al., 2010; Palmer et al., 2007). Given the extant evidence from multiple sources suggesting psychological and biological commonalities in individuals' responses to socially painful events and physical pain (Eisenberger, 2012; MacDonald & Leary, 2005), it's reasonable to draw a connection to these research findings on physical pain and expect that the heightened pain sensitivity among immigrants is evident in both social and physical painful events. In addition to this, acculturation poses challenges in different domains (e.g., learning a new language, obtaining housing and employment, fitting-in local norms and values, Berry, 2006). Hence, future research may additionally examine whether heightened sensitivity may occur in other threatening events, such as facing a culture shock, career challenge, or financial crisis, etc. Since international migration is an increasingly common psychological experience in the globalizing world, we believe this line of research has an important implication for acculturating individuals.

Footnote

[1] The IQ test comprised 15 questions measuring visualization, classification, logical reasoning, and pattern recognition. With regard to the number of correctly answered questions, participants in the exclusion condition (M = 7.36, SD = 1.35) performed worse than those in the inclusion condition (M = 8.56, SD = 1.67). However, there was no main effect of cultural identification or its interaction with the social exclusion manipulation. One possibility is that IQ may be a more stable cognition capacity that is unaffected by cultural adjustment.

Reference

Berry, J. W. (1997). Immigration, acculturation, and adaptation. *Applied Psychology: An International Review, 46*, 5-68.

Berry, J. W. (2006). *Stress perspectives on acculturation*: Cambridge University Press.

Chan, M. Y., Hamamura, T., & Janschewitz, K. (2013). Ethnic differences in physical pain sensitivity: role of acculturation. *Pain, 154*, 119 –123.

Chen, Z., Williams, K., Fitness, J., & Newton, N. (2008). When hurt will not heal: Exploring the capacity to relive social and physical pain. *Psychological Science*, 1-7.

Cheng, C. Y. & Leung, A. K. Y. (2013). Revisiting the multicultural experience-creativity link: The effects of cultural distance and comparison mindset. *Social Psychological and Personality Science, 4,* 475-482.

Clark, R., Anderson, N. B., Clark, V. R., Williams, D.R. (1999). Racism as a Stressor for African Americans: A Biopsychosocial Model. *American Psychologist, 54*, 805-816.

Demes, K. A., & Geeraert, N. (2015). The highs and lows of a cultural transition: A longitudinal analysis of sojourner stress and adaptation across 50 countries. *Journal of Personality and Social Psychology, 109*, 316-337.

DeWall, C. N., MacDonald, G., Webster, G. D., Masten, C. L., Baumeister, R. F., Powell, C., et al. (2010). Acetaminophen reduces social pain behavioral and neural evidence. *Psychological Science*, *21*, 931-937.

Eccleston, C., & Crombez, G. (1999). Pain demands attention: A cognitive–affective model of the interruptive function of pain. *Psychological Bulletin, 125*, 356-366.

Edrington, J., Sun, A., Wong, C., Dodd, M., Padilla, G., Paul, S., & Miaskowski, C. (2010). A pilot study of relationships among pain characteristics, mood disturbances, and

acculturation in a community sample of Chinese American patients with cancer. *Oncology Nursing Forum, 37*, 172–181.

Eisenberger, N. I. & Lieberman, M. D. (2005). Why it hurts to be left out: The neurocognitive overlap between physical and social pain. *The social outcast: Ostracism, social exclusion, rejection, and bullying*, *37*, 109-130.

Eisenberger, N. I. (2012). Broken Hearts and Broken Bones: A Neural Perspective on the Similarities Between Social and Physical Pain. *Current Directions in Psychological Science, 21*, 42-47.

Engle, R. W. (2002). Working memory capacity as executive attention. Current Directions in *Psychological Science, 11*, 19–23.

Golden, C. J. (1987) *Stroop Color and Word Test*. Chicago, IL: Stoetting.

Kim, Y.Y. and McKay-Semmler, K. (2013) Social Engagement and Cross-Cultural Adaptation: An Examination of Direct and Mediated Interpersonal Communication Activities of Educated Non-Natives in the United States. *International Journal of Intercultural Relations, 37*, 99-112.

Jurcik, T., Ahmed, R., Yakobov, E., Solopieieva-Jurcikova, I., & Ryder, A. G. (2013). Understanding the role of the ethnic density effect: Issues of acculturation, discrimination and social support. Journal of Community Psychology, 41(6), 662–678.

Leary, M. R., Springer, C., Negel, L., Ansell, E., & Evans, K. (1998). The causes, phenomenology, and consequences of hurt feelings. *Journal of Personality and Social Psychology*, *74*, 1225-1237.

Leung, A. K. Y., & Chiu, C. Y. (2008). Interactive effects of multicultural experiences and *openness to experience on creativity. Creativity Research Journal, 20, 376–382.*

Lu, M., Hamamura, T., & Chan, Y. (2017). International migration and social pain responses. *Personality and Individual Differences, 109*, 137–141.

MacDonald, G. & Leary, M. R. (2005). Why does social exclusion hurt? The relationship between social and physical pain. *Psychological Bulletin*, *131*, 202–223.

MacLeod, C. M. (1991). Half a century of research on the Stroop effect: an integrative review. *Psychological Bulletin, 109*, 163–203.

Maddux, W. W., & Galinsky, A. D. (2009). Cultural borders and mental barriers: The relationship between living abroad and creativity. *Journal of Personality and Social Psychology, 96*, 1047-1061.

Maner, J. K., DeWall, C. N., Baumeister, R. F., & Schaller, M. (2007). Does social exclusion motivate interpersonal reconnection? Resolving the "porcupine problem.". *Journal of personality and social psychology, 92*, 42-55.

McDonald, J. T., & Kennedy, S. (2004). Insights into the 'healthy immigrant effect': health status and health service use of immigrants to Canada. *Social science & medicine*, *59*, 1613-1627.

Mesoudi, A. (2009). How cultural evolutionary theory can inform social psychology and vice versa. Psychological Review, 116, 929–952.

Nguyen, A., & Benet-Martínez, V. (2013). Biculturalism and Adjustment A Meta-Analysis. *Journal of Cross-Cultural Psychology, 44*, 122-159.

Oishi, S. (2010). The psychology of residential mobility implications for the self, social relationships, and well-being. *Perspectives on Psychological Science, 5*, 5-21.

Over, H., & Uskul, A. K. (2016). Culture moderates children's responses to ostracism situations. *Journal of Personality and Social Psychology, 110*, 710-24.

Palmer, B., Macfarlane, G., Afzal, C., Esmail, A., Silman, A., & Lunt, M. (2007). Acculturation and the prevalence of pain amongst South Asian minority ethnic groups in the UK. *Rheumatology, 46*, 1009–1014.

Pfundmair, M., Aydin, N., Du, H., Yeung, S., Frey, D., & Graupmann, V. (2015). Exclude me if you can—Cultural effects on the outcomes of social exclusion. *Journal of Cross-Cultural Psychology, 46,* 579–596.

Pfundmair, M., Graupmann, V., Frey, D., & Aydin, N. (2015). The different behavioral intentions of collectivists and individualists in response to social exclusion. *Personality and Social Psychology Bulletin, 41,* 363– 378.

Pickett, C. L., Gardner, W. L., & Knowles, M. (2004). Getting a cue: The need to belong and enhanced sensitivity to social cues. *Personality and Social Psychology Bulletin, 30*, 1095-1107.

Ren, D., Wesselmann, E. D., & Williams, K. D. (2013). Interdependent self-construal moderates coping with (but not the initial pain of) ostracism. *Asian Journal of Social Psychology, 16,* 320–326.

Ryder, A. G., Alden, L. E., & Paulhus, D. L. (2000). Is acculturation unidimensional or bidimensional? A head-to-head comparison in the prediction of personality, self-identity, and adjustment. *Journal of Personality and Social Psychology, 79*, 49-65.

Ryder, A. G., Alden, L. E., Paulhus, D. L., & Dere, J. (2013). Does acculturation predict interpersonal adjustment? It depends on who you talk to. *International Journal of Intercultural Relations, 37*, 502-506.

Rhudy, J. L., & Meagher, M. W. (2000). Fear and anxiety: divergent effects on human pain thresholds. *Pain*, *84*, 65-75.

Schwartz, S. J., Unger, J. B., Zamboanga, B. L., & Szapocznik, J. (2010). Rethinking the concept of acculturation: Implications for theory and research. *American Psychologist, 65(4)*, 237.

Suanet, I., & van de Vijver, F. J. R. (2009). Perceived cultural distance and acculturation among exchange students in Russia. *Journal of Community & Applied Social Psychology, 19*, 182–197.

Uskul, A. K., & Over, H. (2014). Responses to social exclusion in cultural context: Evidence from farming and herding communities. *Journal of Personality and Social Psychology, 106*, 752-771.

Ward, C., & Kennedy, A. (2001). Coping with cross-cultural transition. *Journal of Cross-Cultural Psychology, 32*, 636-642.

Woo, C. W., Koban, L., Kross, E., Lindquist, M. A., Banich, M. T., Ruzic, L., Andrews-Hanna, J. R., & Wager, T. D. (2014). Separate neural representations for physical pain and social rejection. *Nature Communications, 17*, 5380.

Zimmermann, J., & Neyer, F. J. (2013). Do we become a different person when hitting the road? Personality development of sojourners. *Journal of Personality and Social Psychology, 105*, 515-530.

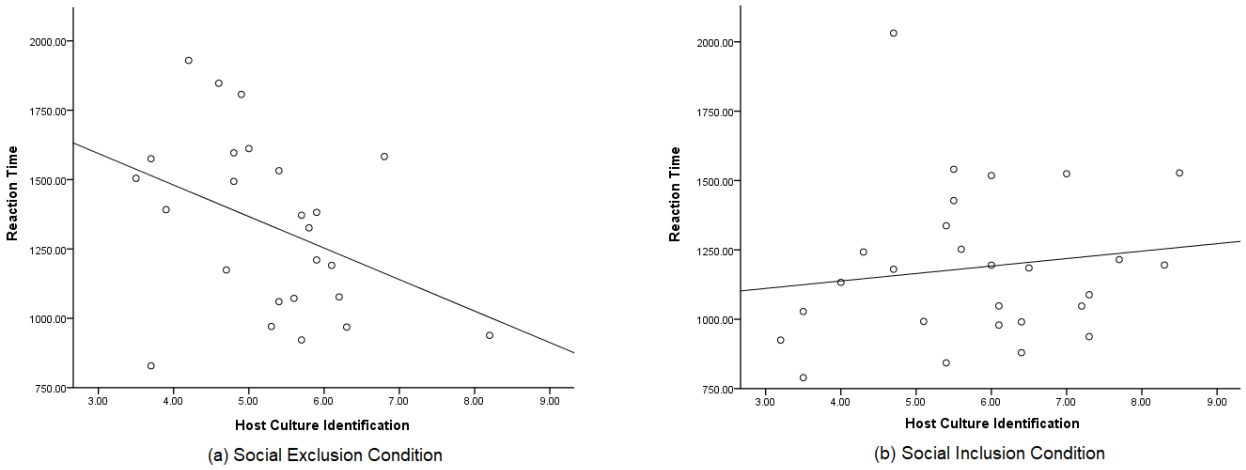

Figure 1. The effect of host culture identification on Stroop task performance in Study 2a was found for the international students in the social exclusion condition (a) but not among those in the social inclusion condition (b).

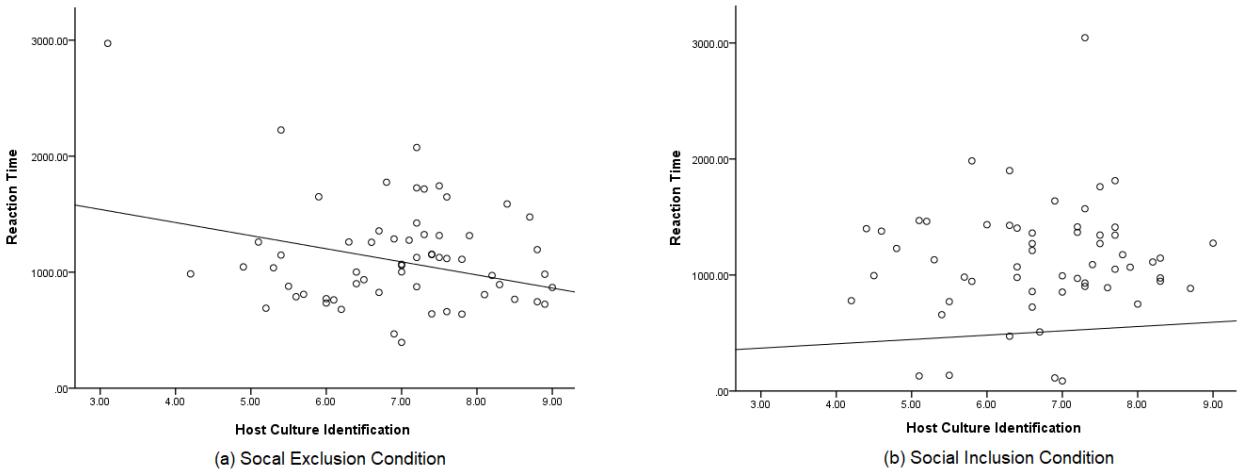

Figure 2. The effect of host culture identification on Stroop task performance in Study 2b was found for in the social exclusion condition (a) but not for the social inclusion condition (b).

Appendix

Passages used to manipulate recalled acculturation experience:

Small cultural distance

> Let me describe my experience during the exchange study. In this foreign country, I found good restaurants that served tasty local food, which was quite similar to my home country food. The city I stayed had atmosphere and landscape that were somehow similar to my home city, and the transportation system also worked in a similar way. I enjoyed exploring the environment a lot.
>
> The language there has many similarities with my mother tongue, in terms of common vocabulary, syntax and sounds. I would say learning this language was actually easier for me than to someone from more faraway place. I was able to talk to local people and understand the local media easily. These experiences made learning the language more enjoyable.
>
> The culture there had customs and practices that were similar to my home culture. I had a lot of fun participating in those activities and talking about our similarities. In these interactions, I also found that people there share many similar beliefs, opinions, and values to the people in my home culture. I found these interactions interesting and they definitely broadened my horizons.

Large cultural distance

> Let me describe my experience during the exchange study. In this foreign country, I found good restaurants that served tasty local food, which was unlike anything I had tasted before. The city I stayed had atmosphere and landscape that were nothing like my home city, and the transportation system also worked in a very different way. I enjoyed exploring the city a lot.
>
> The language there is quite different from my mother tongue, in terms of vocabulary, syntax and sounds. I would say learning this language was actually more challenging for me than to someone from neighboring countries. In the very beginning, I could not really talk to local people or understand the local media. My language skills improved with time, and these experiences made learning the language more enjoyable.
>
> The culture there had customs and practices that were quite different from my home culture. I had a lot of fun participating in those activities and talking about our differences. In these interactions, I also found that people there hold beliefs, opinions, and values that are very different from people in my home culture. I found these interactions interesting and they definitely broadened my horizons.

Supplemental Table 1

Correlation coefficients between variables under different conditions in Study 2a

Variable	Exclusion Condition *Mean* (*SD*)	Inclusion Condition *Mean* (*SD*)	Reaction Time *r*	Host Culture Identification *r*	Heritage Culture Identification *r*
Reaction Time	1334.58 (311.41)	1187.13 (274.86)		.14	.001
Host Culture Identification	5.28 (1.07)	5.82 (1.43)	-.39		.37
Heritage Culture Identification	7.23 (1.22)	7.36 (1.60)	-.20	.46	

Note. For the correlation table, values above the diagonal are for the social inclusion condition whereas those below the diagonal are for the social exclusion condition.

Supplemental Table 2

Correlation coefficients between variables under different conditions in Study 2b

Variable	Exclusion Condition Mean (*SD*)	Inclusion Condition Mean (*SD*)	Effort *r*	Reaction Time *r*	Host Culture Identification *r*	Heritage Culture Identification *r*
Effort	69.89 (24.48)	67.47 (23.97)		-.21	-.21	.04
Reaction Time	1155.18 (472.88)	1125.12 (489.47)	.24		.10	.36
Host Culture Identification	6.85 (1.36)	6.71 (1.15)	-.34	-.34		.21
Heritage Culture Identification	7.23 (1.37)	7.51 (1.04)	.05	.15	.32	

Note. For the correlation table, values above the diagonal are for the social inclusion condition whereas those below the diagonal are for the social exclusion condition.

Supplemental Table 3

Regression coefficients on reaction time and correlation coefficients between variables in Study 2b

Variable	*B* (*SE*) With covariates	*B* (*SE*) Without covariates	Education Level *r*	English Proficiency *r*	Condition *r*	Host Culture Identification *r*
Age	12.67 (5.46)		-.17	.02	.04	.07
Education Level	-23.25 (29.37)		-	.04	-.08	.06
English Proficiency	11.05 (30.77)			-	.08	.16
Condition	19.96 (85.01)	35.43 (85.91)			-	.06
Host Culture Identification	33.64 (53.68)	40.23 (54.02)				-
Condition x Host Culture Identification	-158.03 (69.20)	-159.35 (69.73)				